FEMA 209. 390496

FLOOD INSURANCE STUDY

SCIOTO COUNTY, OHIO

UNINCORPORATED AREAS

JUNE 19, 1989

Federal Emergency Management Agency

COMMUNITY NUMBER - 390496

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

TABLE OF CONTENTS

		Page
1.0	INTRODUCTION	1
1.1	Purpose of Study	1
1.2	Authority and Acknowledgments	1
1.3	Coordination	1
2.0	AREA STUDIED	2
2.1	Scope of Study	2
2.2	Community Description	2
2.3	Principal Flood Problems	2
2.4	Flood Protection Measures	4
3.0	ENGINEERING METHODS	4
3.1	Hydrologic Analyses	4
3.2	Hydraulic Analyses	5
4.0	FLOODPLAIN MANAGEMENT APPLICATIONS	6
4.1	Floodplain Boundaries	6
4.2	Floodways	7
5.0	INSURANCE APPLICATION	11
6.0	FLOOD INSURANCE RATE MAP	11
7.0	OTHER STUDIES	12
8.0	LOCATION OF DATA	12
9.0	REFERENCES AND BIBLIOGRAPHY	12

TABLE OF CONTENTS (continued)

Page

FIGURES

Figure 1 - Vicinity Map 3

Figure 2 - Floodway Schematic 11

TABLES

Table 1 - Summary of Discharges 5

Table 2 - Floodway Data 8

EXHIBITS

Flood Profiles

Ohio River	Panels 01P-02P
Scioto River	Panels 03P-04P
Rarden Creek	Panel 05P

Flood Insurance Rate Map Index
Flood Insurance Rate Map

Elevation Reference Marks

FLOOD INSURANCE STUDY

SCIOTO COUNTY,
UNINCORPORATED AREAS,
OHIO

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Unincorporated Areas of Scioto County, Ohio, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by Dodson-Lindblom Associates, Inc., (the Study Contractor) for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-86-C-2232. This study was completed in June 1987.

1.3 Coordination

On January 29, 1986, an initial coordination meeting was held with representatives of FEMA, Scioto County, and the Study Contractor.

On July 13, 1988, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, the Ohio Department of Natural Resources (ODNR), FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the unincorporated areas of Scioto County, Ohio. The area of study is shown on the Vicinity Map (Figure 1). The incorporated areas within the county were excluded from this study.

Flooding caused by overflow of the Ohio River, the Scioto River, and Rarden Creek was studied in detail.

Areas having low development potential or minimal flood hazards were previously studied using approximate analyses. The results were shown on the Flood Hazard Boundary Map for Scioto County, Ohio (Reference 1) and are incorporated into this Flood Insurance Study.

The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through June 1992. The scope and methods of study were proposed to and agreed upon by FEMA and Scioto County.

2.2 Community Description

Scioto County is in southern Ohio, and is bordered by Pike and Jackson Counties, Ohio, on the north; Adams County, Ohio, on the west; Lawrence County, Ohio, on the east; Lewis and Greenup Counties, Kentucky, and the Ohio River, on the south. Scioto County is served by U.S. Routes 23 and 52; State Routes 73, 104, 125, 139, 140, 239, 335, 348, 371, 522, 722, 728, 776, and 852; the CSX railroad; the Grand Trunk Western Railroad; and the Norfolk Southern Railway. The 1980 population of Scioto County was reported to be 84,545 (Reference 2).

Approximately 67 percent of the area in Scioto County is wooded and most of the remaining area is used for agricultural purposes. The terrain is hilly except in the Ohio River Valley.

Scioto County has a temperate climate characterized by moderate differences in temperature and precipitation. Based on data from the City of Portsmouth, Ohio, mean monthly temperatures range from 32.0 degrees Fahrenheit (^{o}F) in January to 75.9^{o}F in July. The average annual precipitation in the region is 41.3 inches (Reference 3).

2.3 Principal Flood Problems

Newspaper accounts indicate that flooding occurs frequently in Scioto County. On several occasions, State Route 73 has been closed through the Village of Rarden due to high water.

The Ohio River flood of record in Scioto County, which had an estimated recurrence interval of about 130 years, occurred in January 1937 (Reference 4).

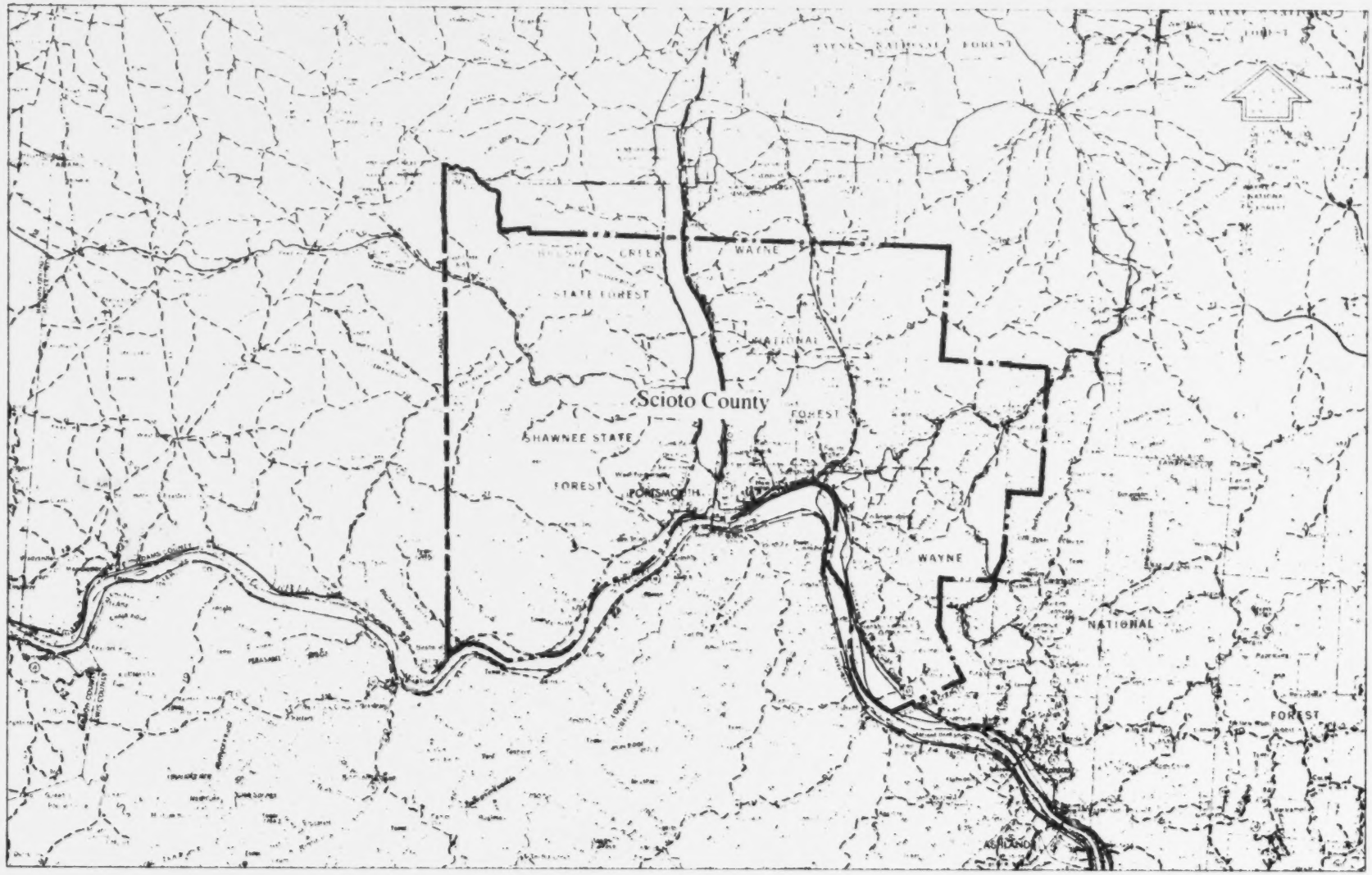


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

SCIOTO COUNTY, OH
(UNINCORPORATED AREAS)

APPROXIMATE SCALE

8 0 8 16 24 MILES

VICINITY MAP

2.4 Flood Protection Measures

The Portsmouth-New Boston urban area is protected by earthen levees and floodwalls constructed in the 1940s by the U.S. Army Corps of Engineers (COE) following the 1937 flood on the Ohio River. The levees and floodwalls extend several feet above the flood stages attained during that flood. The levees and floodwalls have been operated and maintained by the City of Portsmouth and the Village of New Boston since 1950.

No other flood protection measures are known to exist within the study area.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that is expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

The 100-year discharge for Rarden Creek was determined using regression equations presented in ODNR Bulletin No. 45 (Reference 5).

The 100-year discharge for the Scioto River was determined by the COE using data relating the drainage area to peak discharges. These data were developed by the COE from flow-frequency data obtained at various stream gaging stations on the Scioto River and neighboring streams.

Flood discharges for the Ohio River were determined by the COE from flow-frequency data obtained at various stream gaging stations on the river.

Peak discharge-drainage area relationships for the 10-, 50-, 100-, and 500-year floods of the Ohio River and the 100-year floods of Rarden Creek and the Scioto River are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
RARDEN CREEK at mouth	17.07	N/A	N/A	8,020	N/A
SCIOTO RIVER just upstream of confluence of Scioto Brush Creek	6,197	N/A	N/A	257,500	N/A
OHIO RIVER about 1.6 miles upstream of U.S. Grant Bridge	62,500	481,000	590,000	638,000	762,000

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross-section data for the backwater analyses on Rarden Creek were obtained from field surveys. Cross-section data for the Scioto River were taken from aerial photographs and obtained from the COE. All bridges and culverts were surveyed to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles and on the Flood Insurance Rate Map.

Roughness coefficients (Manning's "n") for the streams studied were estimated from aerial photographs and field reconnaissance of the study area. The coefficients average 0.03 for the channels and 0.05 for the overbank areas.

The 100-year flood elevations along Rarden Creek and the Scioto River were computed using the HEC-2 step-backwater computer program (Reference 6). The starting water-surface elevation for Rarden Creek was estimated using the slope-area method, and the starting water-surface elevation for the Scioto River was obtained from the COE report "Lucasville, Ohio, Floodplain Study" (Reference 7). The 10-, 50-, and 100-year flood elevations along the Ohio River were obtained from the COE "Ohio River Profiles" report (Reference 4). The Ohio River 500-year flood elevation was estimated from flow-frequency data provided by the COE for various gaging stations on the

Ohio River and from the 100-year and January 1937 flood profiles also provided by the COE (Reference 4).

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals. In cases where the 50- and 100-year flood elevations are close together, due to limitations of the profile scale, only the 100-year profile has been shown.

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the map and described in the exhibit labeled Elevation Reference Marks.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24000 with a contour interval of 20 feet (Reference 8).

The 100- and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map. On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AH, AO, A99, V, and VE) and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year floodplain boundary was delineated using the Flood Hazard Boundary Map for Scioto County (Reference 1).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces the flood-carrying capacity, increases the flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. A free-flow profile between the mouth of the Scioto River and the confluence of Scioto Brush Creek was not developed; therefore, a floodway was not computed for this reach. A floodway was computed upstream of Scioto Brush Creek. At the request of the ODNR, a floodway was delineated for this reach based on the computed floodway width at cross-section A and engineering judgment. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections and are shown in Table 2, Floodway Data. The computed floodways are shown on the Flood Insurance Rate Map. In cases where the floodway and the 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown. Portions of the floodway for the Ohio River lie outside the county boundary. The Flood Insurance Study for Greenup County, Kentucky (Reference 9) was used to determine the floodway data for the Ohio River along the sections where Greenup and Scioto Counties are contiguous.

Along streams where floodways have not been computed, the community must ensure that the cumulative effect of development in the floodplain will not cause more than a 1.0-foot increase in the base flood elevations at any point within the community.

The area between the floodway and the 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
OHIO RIVER								
A	358.0	4844	177,501	3.7	535.0	535.0	536.0	1.0
B	357.0	5255	201,511	3.2	535.3	535.3	536.3	1.0
C	348.0	1415	94,227	6.8	538.1	538.1	539.0	0.9
D	347.0	2141	109,100	5.8	538.6	538.6	539.5	0.9
E	346.0	1470	97,799	6.5	538.8	538.8	539.8	1.0
F	345.0	1420	91,654	7.0	539.1	539.1	540.1	1.0
G	344.0	1590	81,969	7.8	539.5	539.5	549.5	1.0
H	343.0	1926	121,799	5.2	540.4	540.4	541.3	0.9
I	342.2	1570	101,393	6.3	540.5	540.5	541.4	0.9
J	341.2	2055	128,563	5.0	541.0	541.0	542.0	1.0
K	340.7	2314	116,880	5.5	541.2	541.2	542.1	0.9
L	340.0	1888	100,310	6.4	541.3	541.3	542.2	0.9
M	339.0	1630	97,205	6.6	541.5	541.5	542.5	1.0
N	338.0	1530	88,217	7.2	541.8	541.8	542.8	1.0
O	337.0	1565	95,978	6.6	542.3	542.3	543.3	1.0
P	336.0	1090	98,449	6.5	542.6	542.6	543.6	0.9
Q	335.0	2093	111,439	5.7	543.1	543.1	544.0	0.9

[1]MILES BELOW HEADWATERS AT PITTSBURGH
[2]THIS WIDTH EXTENDS BEYOND COUNTY BOUNDARY

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

SCIOTO COUNTY, OH
(UNINCORPORATED AREAS)

FLOODWAY DATA

OHIO RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
SCIOTO RIVER								
A	48,800	6650	59,634	4.3	535.4	530.0[2]	531.0	1.0
B	52,676	6320	72,151	3.6	535.4	531.7[2]	532.6	0.9
C	57,544	7100	78,922	3.3	535.4	532.4[2]	533.3	0.9
D	59,931	6660	69,426	3.7	535.4	532.7[2]	533.6	0.9
E	62,011	6450	70,722	3.6	535.4	533.4[2]	534.3	0.9
F	65,448	5550	73,664	3.5	535.4	534.1[2]	535.1	1.0
G	68,162	4560	50,298	5.1	535.4	534.6[2]	535.6	1.0
H	69,693	4290	49,277	5.2	535.7	535.7	536.7	1.0
I	72,138	3350	43,972	5.9	537.1	537.1	538.1	1.0
J	73,843	2921	52,246	4.9	538.8	538.8	539.7	0.9
K	75,020	3300	52,661	4.9	539.3	539.3	540.1	0.8
L	76,748	4044	83,297	3.1	542.6	542.6	543.2	0.6
M	78,614	4641	99,018	2.6	542.8	542.8	543.5	0.7
N	80,104	4940	87,410	2.9	542.9	542.9	543.7	0.8
O	81,764	5170	88,419	2.9	543.1	543.1	543.9	0.8
P	83,474	5104	87,410	2.9	543.3	543.3	544.1	0.8
Q	85,774	4835	84,464	3.0	543.6	543.6	544.5	0.9
R	87,504	4666	85,190	3.0	543.8	543.8	544.7	0.9
S	89,084	4280	70,711	3.6	544.0	544.0	544.9	0.9
T	91,384	4174	66,731	3.9	544.4	544.4	545.3	0.9
U	94,104	4920	74,225	3.5	545.0	545.0	545.9	0.9
V	96,364	5745	89,549	2.9	545.5	545.5	546.4	0.9
W	100,144	5890	109,475	2.4	545.9	545.9	546.8	0.9
X	102,244	5301	85,195	3.0	546.0	546.0	546.9	0.9
Y	103,894	5198	79,692	3.2	546.3	546.3	547.2	0.9
Z	106,074	5860	87,745	2.9	546.6	546.6	547.5	0.9

[1]FEET ABOVE MOUTH
[2]ELEVATIONS WITHOUT CONSIDERING BACKWATER EFFECT FROM THE OHIO RIVER

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

SCIOTO COUNTY, OH
(UNINCORPORATED AREAS)

FLOODWAY DATA

9

SCIOTO RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
SCIOTO RIVER								
AA	108,624	5585	80,951	3.2	546.9	546.9	547.8	0.9
AB	110,514	4875	54,248	4.7	547.0	547.0	547.9	0.9
AC	112,114	4905	64,067	4.0	548.0	548.0	548.9	0.9
AD	113,804	4735	63,986	4.0	548.5	548.5	549.3	0.8
AE	115,134	4450	64,889	4.0	549.0	549.0	549.7	0.7

[1]FEET ABOVE MOUTH

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

SCIOTO COUNTY, OH
(UNINCORPORATED AREAS)

FLOODWAY DATA

SCIOTO RIVER

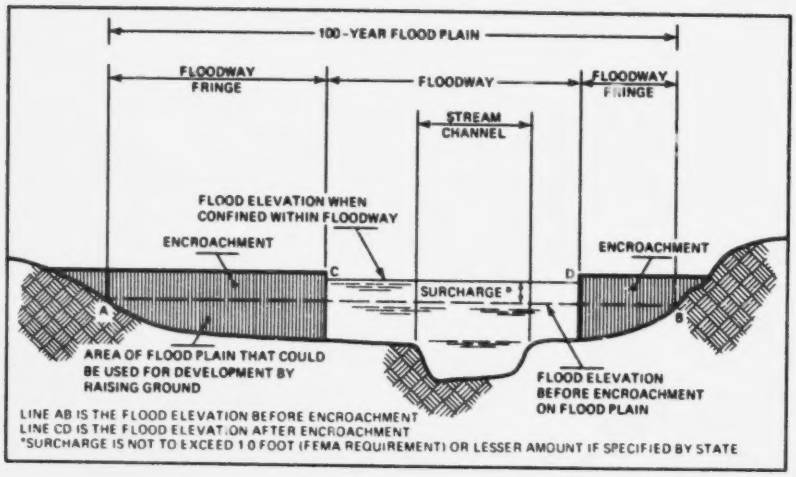

100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE *
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FIGURE 2 - Floodway Schematic

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 100-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average

depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols the 100- and 500-year floodplains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

Flood Insurance Studies published for Greenup and Lewis Counties, Kentucky; Pike and Lawrence Counties, Ohio; the City of Portsmouth, Ohio; and the Village of New Boston, Ohio (References 9-14) are in agreement with this study.

This Flood Insurance Study supersedes the previously printed Flood Hazard Boundary Map for Scioto County, Ohio (Reference 1).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 175 West Jackson Boulevard, 4th Floor, Chicago, Illinois 60604-2698.

9.0 REFERENCES AND BIBLIOGRAPHY

1. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Scioto County, Unincorporated Areas, Ohio, May 1978.

2. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Ohio, Washington, D.C., February 1982.

3. ————, National Oceanic and Atmospheric Administration, Climatological Data-Annual Summary-Ohio, 1986.

4. U.S. Army Corps of Engineers, Ohio River Division, Ohio River Profiles, January 1981, revised March 1983.

5. Ohio Department of Natural Resources, Division of Water, Bulletin No. 45, Floods in Ohio, Magnitude and Frequency, E.E. Webber and W.P. Bartlett, Jr., May 1977.

6. ————, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Computer Program 723-X6-L202A, Davis, California, April 1984.

7. ----------, Lucasville, Ohio, Floodplain Study, Prepared for the Ohio Department of Natural Resources, unpublished.

8. U.S. Geological Survey, 7.5 Minute Series Topographic Maps, Scale 1:24000, Contour Interval 20 Feet: Jaybird, Ohio, 1961, photorevised 1974; Rarden, Ohio, 1961, photorevised 1974; Wakefield, Ohio, 1961, photorevised 1974; Lucasville, Ohio, 1961, photorevised 1975; West Portsmouth, Ohio, 1961, photorevised 1974; New Boston, Ohio-Kentucky, 1961, photorevised 1975.

9. Federal Emergency Management Agency, Flood Insurance Study, Greenup County, Unincorporated Areas, Kentucky, January 1983.

10. ————, Flood Insurance Study, Lewis County, Unincorporated Areas, Kentucky, February 1987.

11. ————, Flood Insurance Study, Pike County and Incorporated Areas, Ohio, January 1988.

12. ————, Flood Insurance Study, Lawrence County, Unincorporated Areas, Ohio, in progress.

13. ————, Flood Insurance Study, City of Portsmouth, Scioto County, Ohio, August 1983.

14. ————, Flood Insurance Study, Village of New Boston, Scioto County, Ohio, January 1983.

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
1	0040	549.78	standard U.S. Geological Survey tablet set in concrete post located along State Route 104, about 4.5 miles north of Rushtown, 119 feet west of State Route 104
2	0040	533.32	standard U.S. Geological Survey tablet set in second step between 2 small buildings, 76 feet east of northeast corner of house, 250 feet east of intersection of Bear Creek Rarden Road and State Route 104
3	0040	573.27	standard U.S. Geological Survey tablet set in second step located 3 feet southeast of house about 400 feet west of State Route 104, about 8.6 miles north of Rushtown along State Route 104
4	0040	557.39	U.S. Coast and Geodetic Survey disk set in top center of west headwall of concrete box culvert under Norfolk Southern Railway, 61 feet east of centerline of northbound lane of U.S. Route 23, about 21 feet west of west rail of west track, 5.5 feet south of north end of headwall, 8 feet below level of track, about 1.85 miles south along Norfolk Southern Railway from railroad bridge over Salt Creek
5	0040	564.86	U.S. Coast and Geodetic Survey disk set vertically in west face of rock cut located 19 feet east of east rail of east track of Norfolk Southern Railway, 69 feet south of dirt end of cut, 253 feet north of centerline of Blakeman Road

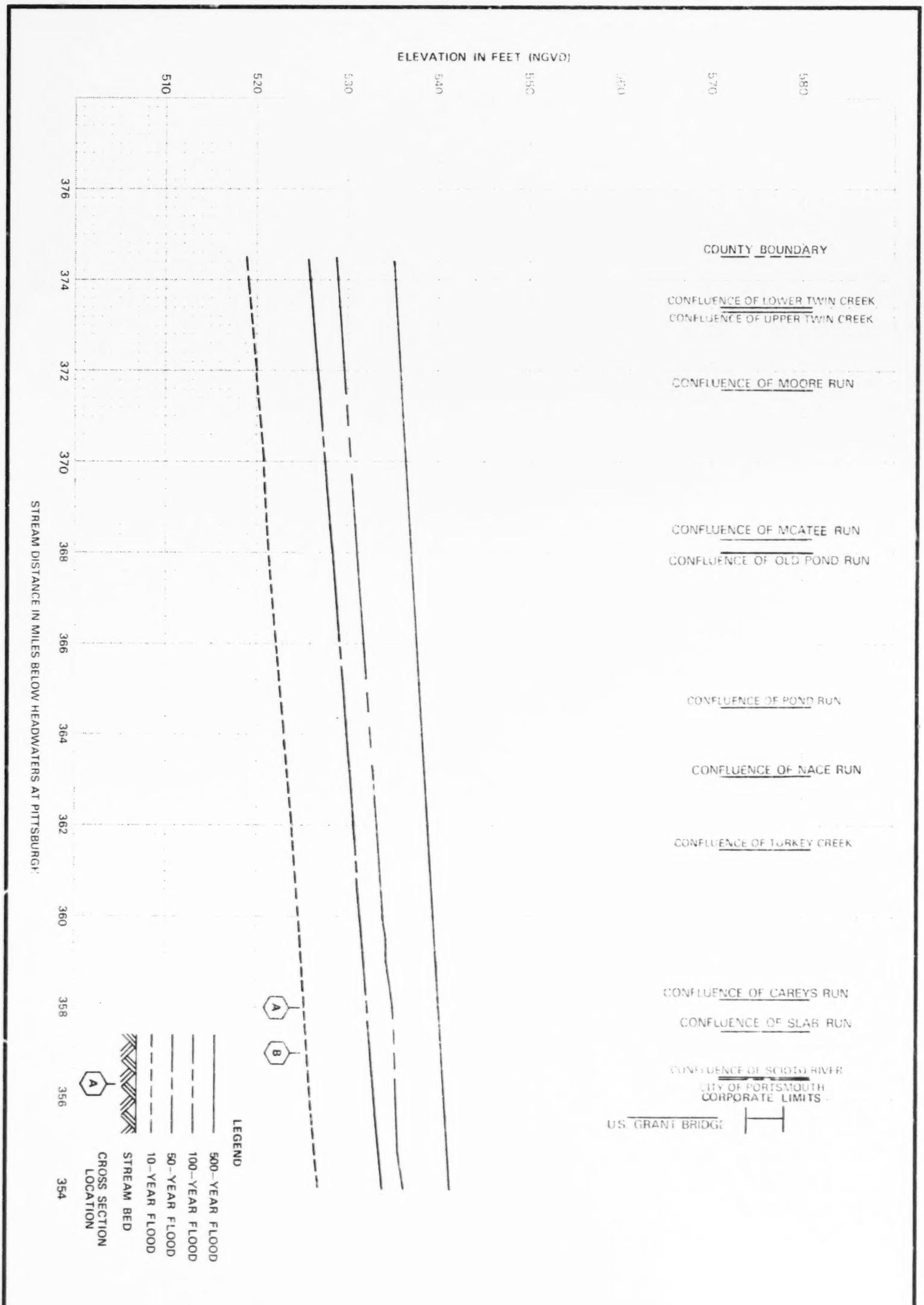
ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
6	0040	558.67	U.S. Coast and Geodetic Survey disk set on top of southwest concrete headwall of culvert under Norfolk Southern Railway, 9 feet southwest of southwest rail, about 27 feet northeast of centerline of northbound lane of U.S. Route 23, about 0.68 mile south of intersection of U.S. Route 23 and Cockrell's Road
7	0105	556.59	U.S. Coast and Geodetic Survey disk set in top of concrete post located about 2,100 feet south of intersection of Norfolk Southern Railway and Lucasville Minford Road, 27 feet west of west rail of main track, 100 feet north of centerline of first blacktop road crossing north of station
8	0105	550.15	top of iron bolt stamped "R 120 1943" set in top of west headwall of Norfolk Southern Railway concrete-arch culvert for Candy Run, 23 feet west of centerline of west track, about 4 feet lower than track, about 2.1 miles south along Norfolk Southern Railway from intersection of railroad and Lucasville Minford Road, 0.2 mile south of milepost N616, about 275 feet south of underpass
9	0105	564.18	standard disk stamped "Q 72 X" set in top of northwest stone wingwall of Norfolk Southern Railway bridge over Houston Hollow Long Run Road, 80 feet east of center of intersection of U.S. Route 23 and Houston Hollow Long Run Road

ELEVATION REFERENCE MARKS

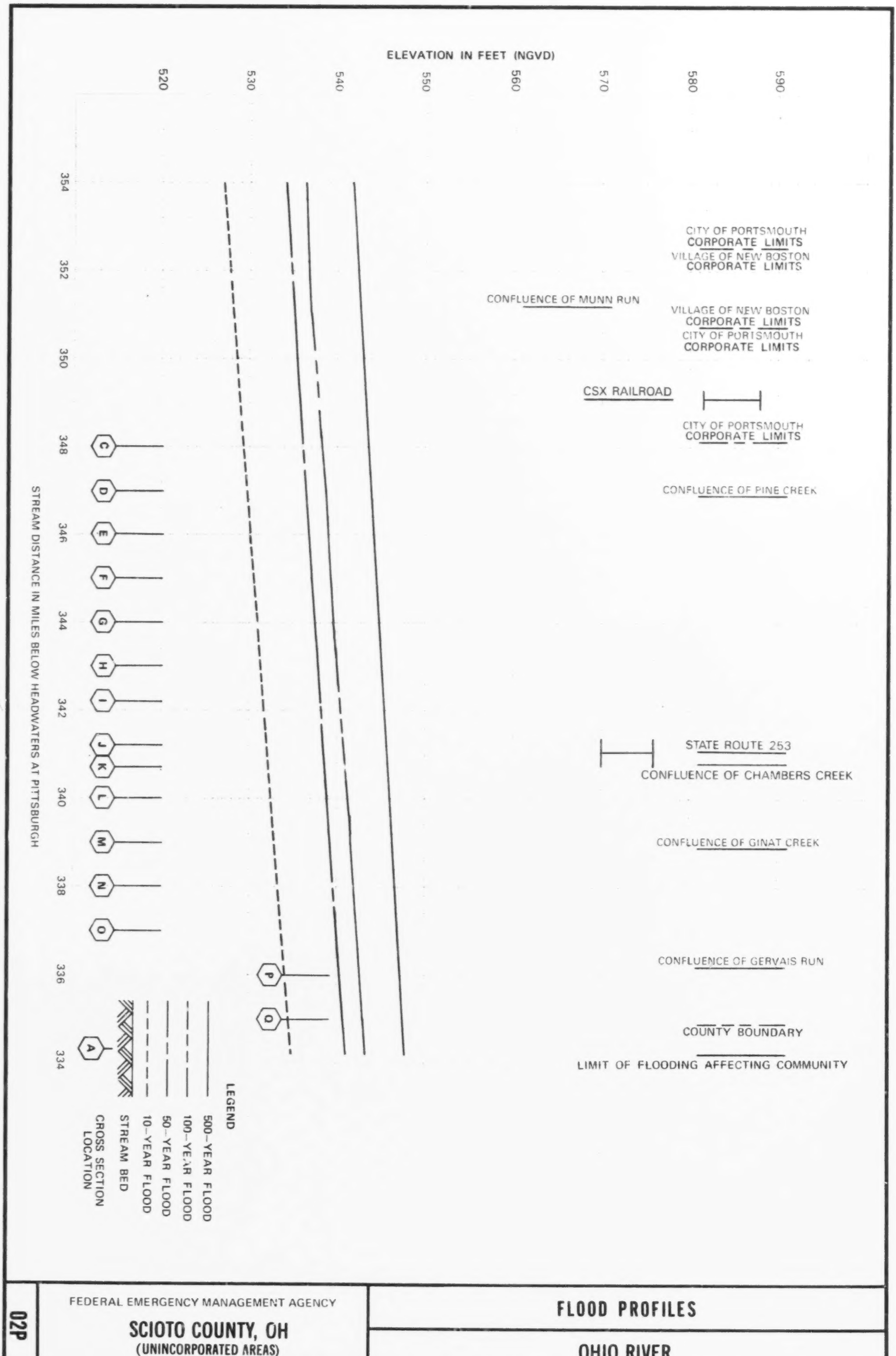
REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
10	0105	568.75	standard disk stamped "S 120 1943" set in top of west headwall of Norfolk Southern Railway bridge over Maple Brenner Road, 12 feet west of centerline of west track
11	0115	544.53	standard disk stamped "S 72 X 1935" set in top south end of west concrete headwall of culvert under Norfolk Southern Railway located about 1.2 miles south along Norfolk Southern Railway from intersection of railroad and Gingersnap Road, about 500 feet north of signal tower
12	0115	537.94	standard disk stamped "V 120 1943" set in top northeast wingwall of Norfolk Southern Railway stone-arch culvert for Carroll Run, about 2.3 miles south along railroad from intersection of railroad and Gingersnap Road, 80 feet south of block-signal control box
13	0015	614.07	chiseled square on northeast abutment of Norfolk Southern Railway bridge over Rarden Creek
14	0015	612.03	chiseled square on southeast corner of State Route 73 bridge over Rarden Creek

☆U.S. GOVERNMENT PRINTING OFFICE: 1989 - 241-146/80614



17

01P	FEDERAL EMERGENCY MANAGEMENT AGENCY **SCIOTO COUNTY, OH** (UNINCORPORATED AREAS)	**FLOOD PROFILES** **OHIO RIVER**



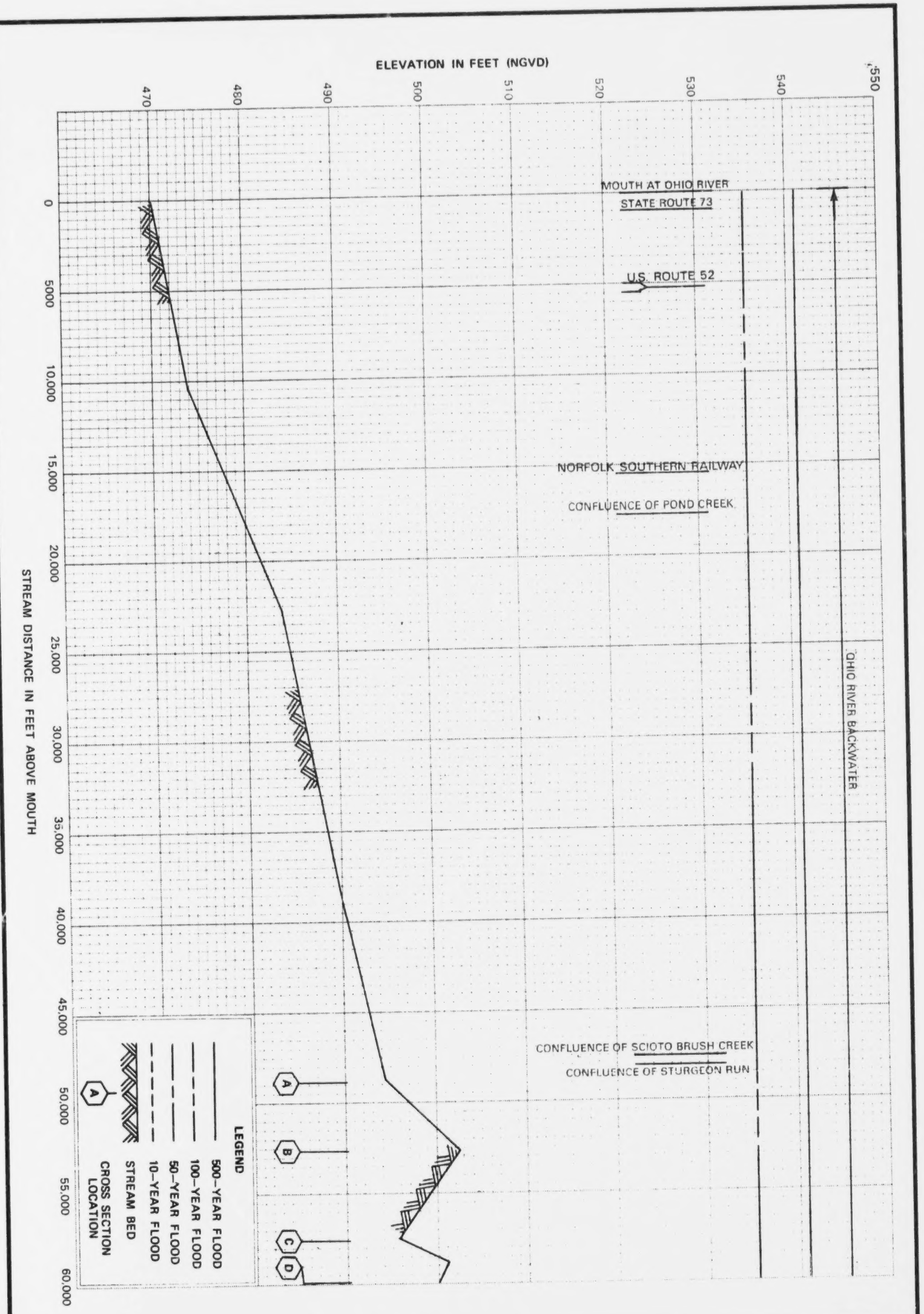
02P

FEDERAL EMERGENCY MANAGEMENT AGENCY

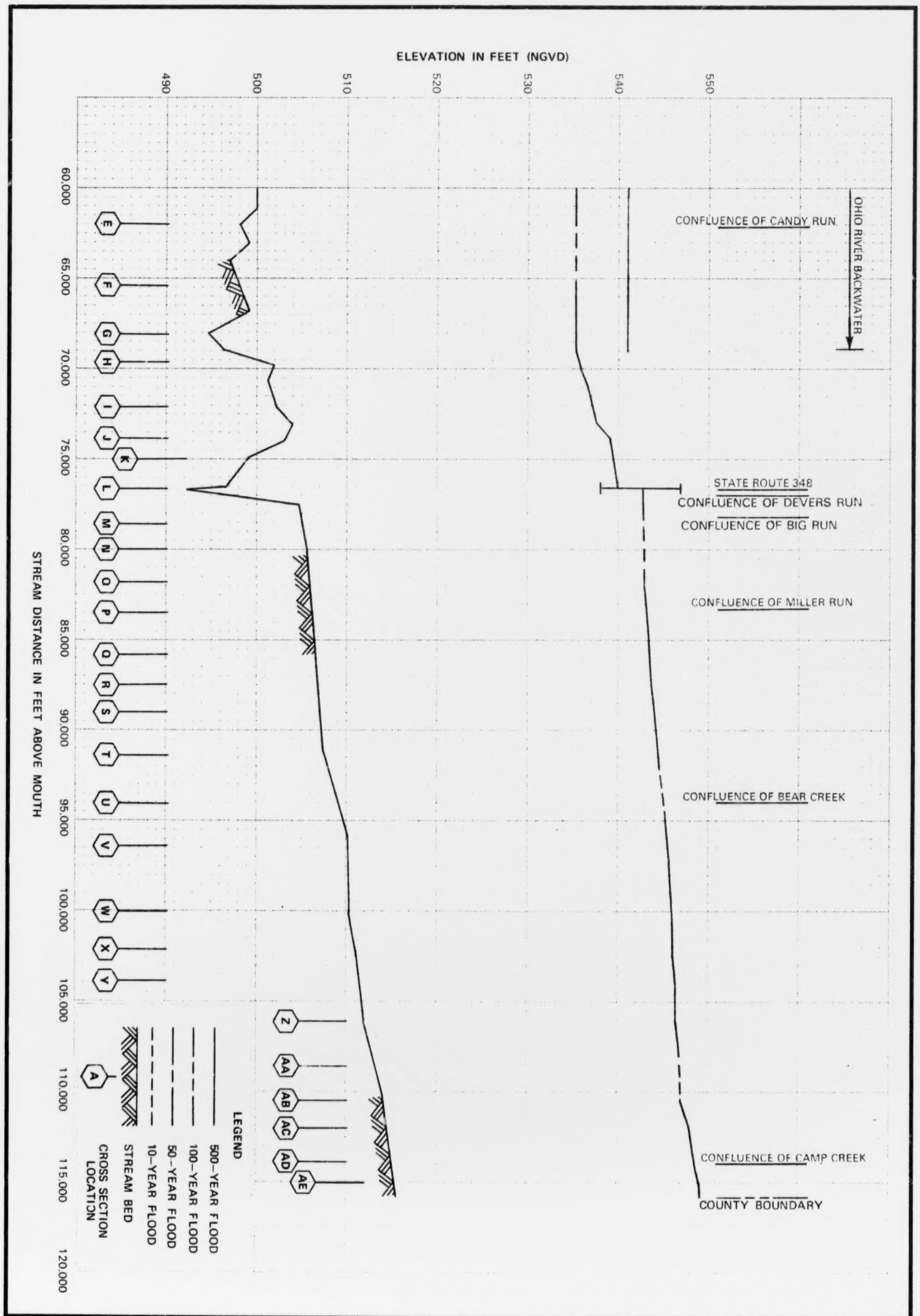
SCIOTO COUNTY, OH
(UNINCORPORATED AREAS)

FLOOD PROFILES

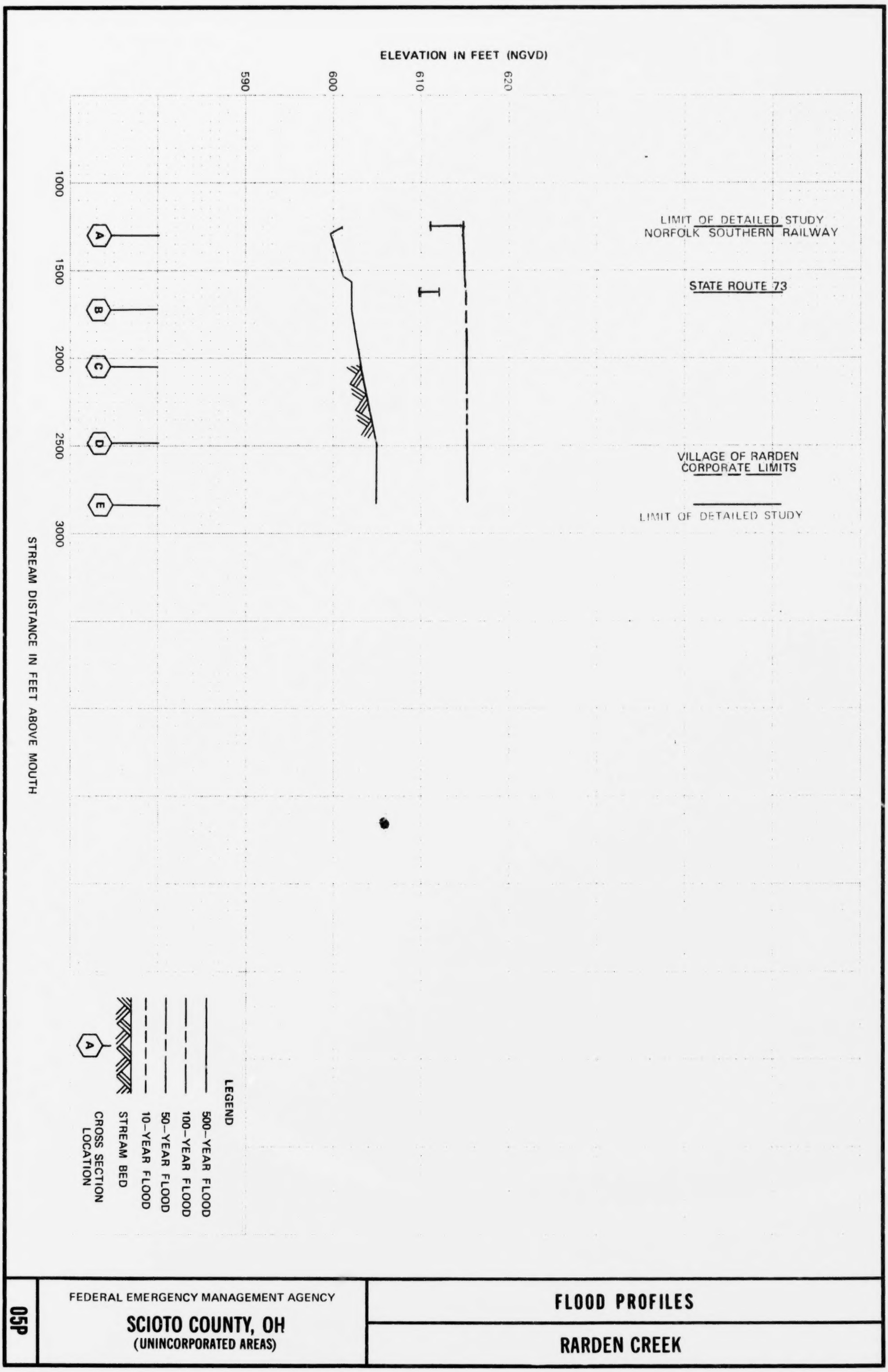
OHIO RIVER



03P	FEDERAL EMERGENCY MANAGEMENT AGENCY **SCIOTO COUNTY, OH** (UNINCORPORATED AREAS)	**FLOOD PROFILES** **SCIOTO RIVER**



04P	FEDERAL EMERGENCY MANAGEMENT AGENCY **SCIOTO COUNTY, OH** (UNINCORPORATED AREAS)	**FLOOD PROFILES** **SCIOTO RIVER**



21

05P

FEDERAL EMERGENCY MANAGEMENT AGENCY

SCIOTO COUNTY, OH
(UNINCORPORATED AREAS)

FLOOD PROFILES

RARDEN CREEK